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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/740,424	12/19/2000	Kiyotaka Tsukada	057329-0001	5114

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780 NORTH WATER STREET
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EXAMINER

CHU, CHRIS C

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 08/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/740,424

Applicant(s)

TSUKADA ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2 and 4 - 9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 4 - 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 22, 2003 has been entered. An action on the RCE follows.

Response to Amendment

2. Applicant's amendment filed on February 25, 2003 has been received and entered in the case.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4, 7 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Alcorn et al.

Regarding claim 1, Alcorn et al. discloses in Fig. 5b a printed circuit board comprising:

- an insulative substrate (4);
- a conductor pattern (8') formed on the substrate; and
- a protection film (12') coating the substrate and the conductor pattern, wherein the conductor pattern (8') includes a bottom surface entirely contacting the substrate, a top surface opposite to the bottom surface, and a pair of flat side surfaces, each of the side surfaces having a lower side surface covered by the protection film and an upper side surface exposed from the protection film, wherein both the bottom surface and the top surface have widths, both the lower side surface covered by the protection film and the conductor pattern have heights, and wherein the width of the bottom surface is greater than the width of the top surface.

Regarding claim 2, Alcorn et al. discloses in Fig. 5b the conductor pattern having a trapezoidal cross-section that is perpendicular to the bottom surface of the conductor pattern.

Regarding claim 4, Alcorn et al. discloses in Fig. 5b the height of the lower side surface covered by the protection film (12') in the conductor pattern (8') being 50% or greater and less than 100% of the height of the conductor pattern.

Regarding claim 7, Alcorn et al. shows in Fig. 5b the conductive pattern (8') having an approximate dimension where the width of bottom surface is at least $\frac{3}{2}$ times wider than the top

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surface, and the height being about 1/2 times the width of the bottom surface. When applying this proportions to the claim formula the value is at least 0.1 but less than 2.5. It is noted that figures are not drawn to scale however, Fig. 5b does fairly suggest these proportions such that the claim range is suggested by Alcorn et al.

Regarding claim 8, Alcorn et al. discloses in Figs. 1a ~ 5b a method for fabricating a printed circuit board comprising the steps of:

- etching an insulative substrate (4, 6 and 8) including a conductor (8) to form a conductor pattern (8') having a bottom surface entirely contacting the substrate, a top surface opposite to the bottom surface, and a pair of side surfaces, wherein the conductor pattern is formed so that a width of the bottom surface is greater than a width of the top surface;
- applying an insulative protection film (12) to the conductor pattern and the substrate; and
- removing part (18) of the protection film (12) to expose the top surface and a part of each of the side surfaces.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 5, 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alcorn et al. in view of Kimiya.

Regarding claim 5, Alcorn et al. discloses the claimed invention except the top surface and the upper side surfaces being coated by a plate. However, Kimiya teaches in Fig. 1(D) a top surface and an upper side surfaces being coated by a plate (44). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Alcorn et al. by using the plate to coat the top surface and the upper side surfaces as taught by Kimiya. The ordinary artisan would have been motivated to modify Alcorn et al. in the manner described above for at least the purpose of increasing the bond strength between conductor patterns and external connectors.

Regarding claim 6, a further difference between the claimed invention and Alcorn et al. is a solder ball. However, Kimiya discloses in Fig. 2 a solder ball (46) contacting the conductor pattern (42) at the upper side surfaces. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Alcorn et al. by using the solder ball as taught by Kimiya. The ordinary artisan would have been motivated to further modify Alcorn et al. in the manner described above for at least the purpose of increasing the bond strength between conductor patterns and external structure.

Regarding claim 9, Alcorn et al. discloses the claimed invention except for a fabrication method further comprising the steps of: plating the exposed upper portion of the conductor pattern and the step of joining a solder ball to the plated upper portion of the conductor pattern. However, Kimiya discloses in Fig. 1 and Fig. 2 a fabrication method further comprising steps of:

plating (44) an exposed upper portion of a conductor pattern (42) and the step of joining a solder ball (46) to the plated upper portion of the conductor pattern. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Alcorn et al. by using the steps of the plating and the joining a solder ball to the plated upper portion of the conductor pattern as taught by Nakahara. The ordinary artisan would have been motivated to modify Alcorn et al. in the manner described above for at least the purpose of providing a high reliability on soldering at low cost (abstract, lines 1 and 2).

Response to Arguments

7. Applicant's arguments with respect to claims 1 and 8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
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c.c.
July 26, 2003

A handwritten signature in black ink, appearing to read 'Eddie Lee', with a large, stylized initial 'E'.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800